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WATER SUPPLY OUTLOOK FOR WASHINGTON

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PROCUREMENT SECTION
CURRENT SERIAL RECORDS

Prepared by

U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Collaborating with

DEPARTMENT OF ECOLOGY STATE OF WASHINGTON

Data included in this report were obtained by the agencies named above in cooperation with the U.S. Forest Service, U.S. Geological Survey, National Park Service, and other Federal, State and Private organizations.

AS OF
JUNE 1, 1971

TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1900 snow courses in Western United States and in the Columbia Basin in British Columbia. Networks of automatic snow water equivalent and related data sensing devices, along with radio telemetry are expanding and will provide a continuous record of snow water and other parameters of key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, Western Regional Technical Service Center, Room 209, 701 N. W. Glisan, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	P. O. Box "F", Palmer, Alaska 99645
Arizona	6029 Federal Building, Phoenix, Arizona 85025
Colorado (N. Mex.)	12417 Federal Building, Denver, Colorado 80202
Idaho	Room 345, 304 N. 8th. St., Boise, Idaho 83702
Montana	P. O. Box 970, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1218 S. W. Washington St., Portland, Oregon 97205
Utah	4012 Federal Bldg., 125 South State St., Salt Lake City, Utah 84111
Washington	360 U.S. Court House, Spokane, Washington 99201
Wyoming	P. O. Box 2440, Casper, Wyoming 82601

PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P. O. Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resources, Water Resources Service, Parliament Building, Victoria, British Columbia



WATER SUPPLY OUTLOOK FOR WASHINGTON

and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

Issued by

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DIRECTOR
DEPARTMENT OF ECOLOGY
STATE OF WASHINGTON

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Report prepared by

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SOIL CONSERVATION SERVICE
360 U.S. COURTHOUSE
SPOKANE, WASHINGTON 99201



WATER SUPPLY OUTLOOK

State of Washington
June 1, 1971

* * * * *
* The weather appears to be cooperating with the orderly outflow *
* of the snowpack in Washington and in the Columbia Basin as a *
* whole. Spells of warm temperature have been followed by cool *
* periods and the rainfall that has occurred has been during the *
* cool periods. The river flows have generally been high but not *
* excessively so and it now appears that the forecasts made on *
* the first of May will be good. In normal years, the precipita- *
* tion that occurs during May and June, as well as the temperature *
* during the rainy periods, will govern the rate of snow melt and *
* the height which the rivers will crest. So far, things look *
* good. *
* * * * *

SNOW COVER

Very few snow courses were measured on May 15 and even less on June 1. The snowpack at those few locations is very good and will sustain the runoff into late summer. On many of the snow courses that were measured on June 1 very little back record is available. Some, therefore, indicate record high measurements for this time of year but most are below the previous high which occurred in 1964. This refers to the snow courses along the Cascade Divide in Washington. In the British Columbia portion of the Basin most courses are near normal.

RESERVOIRS

Only Coeur d'Alene Lake has filled, of the reservoirs reported in this report, as yet this year but all reservoirs are expected to fill and spill by the end of the snow-melt period. All reservoirs, where possible, are now being operated for flood control purposes.

PRECIPITATION

During the month of May precipitation was above normal only in the north central drainage division and in southeastern Washington. The other drainage divisions reported rainfall that ranged from one percent below average to 26 percent below. The spring precipitation figures for April and May are presented later in this report and are self-explanatory.

STREAMFLOW

During the month of May, only the low-elevation watersheds produced below-normal runoff and these, a result of below-normal precipitation during May. The snow-fed streams all produced runoff ranging from 24 percent above normal to 65 percent above.



RESERVOIR STORAGE - 1000 Acre Feet

BASIN or STREAM	RESERVOIR	USABLE ^{1/} CAPACITY	Measured (June)			Normal*
			1971	1970	1969	
<u>COLUMBIA</u>						
Spokane	Coeur d'Alene Lake	225.1	387.6	344.9	289.5	327.0
Columbia	Franklin D. Roosevelt Lake	5232.0	2703.6	2141.4	2122.3	3965.2
Columbia	Banks Lake	761.8	517.7	712.2	347.4	435.3
Okanogan	Conconully Reservoir	13.0	12.0	5.9	12.9	9.8
Okanogan	Salmon Lake	10.5	7.8	9.3	10.5	9.6
Chelan	Lake Chelan	676.1	461.4	309.6	572.5	467.6
<u>YAKIMA</u>						
Yakima	Keechelus Lake	157.8	143.0	144.6	160.4	144.8
Kachess	Kachess Lake	239.0	222.2	219.4	240.5	228.9
Cle Elum	Lake Cle Elum	436.9	378.1	328.8	421.3	395.8
Bumping	Bumping Lake	33.7	17.5	29.7	29.6	30.6
Tieton	Rimrock Lake	198.0	146.3	157.1	197.5	180.4
<u>PUGET SOUND</u>						
Skagit	Ross Reservoir	1202.9	1323.1	890.8	1105.0	1000.5
Skagit	Diablo Reservoir	90.6	87.8	86.5	87.5	84.1
Skagit	Gorge Reservoir	9.8	8.4	8.3	8.4	--

^{1/} Based on Active Storage

* 15-year average 1953-67



SOIL MOISTURE - JUNE

Drainage Basin and Station	Number	Elev.	Profile Depth	(Inches):	Soil Moisture Content		
				Total : Capacity:	(Inches) as of June 1		
					1971	1970	1969
<u>CRAB CREEK</u>							
Jack Woods	18B3m	2600	48	13.6	9.6	8.5	8.9
Krause	18B4m	2440	48	13.6	8.7	8.7	9.1
Sheffels	18B5m	2360	48	13.6	9.1	8.6	7.9
Sherman	18B7m	2440	48	13.6	8.2	8.2	7.7
Wheatridge	18B6m	2200	48	13.6	Station destroyed	8.4	7.6
<u>OKANOGAN</u>							
Salmon Meadows	19A2M	4500	48	5.4	3.6	3.7	3.6
Trout Creek	3-M	3600	48	7.3	Late report	--	5.4
<u>YAKIMA</u>							
Domery Flat	21B20m	2200	48	6.9	4.5	4.4	--
Lake Cle Elum	21B14M	2200	48	12.8	9.2	9.2	--
<u>WALLA WALLA</u>							
Couse	17C3m	3650	48	11.1	9.8	9.8	11.0
Helmers	17C2M	4400	48	12.0	10.1	9.7	11.4
<u>WENATCHEE</u>							
Upper Wheeler	20B7M	4400	48	12.7	9.9	9.2	9.8

FALL SOIL MOISTURE

Drainage Basin and Station	Number	Elev.	Profile Depth	(Inches):	Soil Moisture Content		
				Total : Capacity:	(Inches) as of Oct. 1		
					1970	1969	1968
<u>CRAB CREEK</u>							
Jack Woods	18B3m	2600	48	13.6	7.0	7.5	7.1
Krause	18B4m	2440	48	13.6	4.4	5.9	5.2
Sheffels	18B5m	2360	48	13.6	4.4	4.5	4.9
Sherman	18B7m	2440	48	13.6	3.8	4.2	3.9
Wheatridge	18B6m	2200	48	13.6	7.8	5.4	4.6
<u>OKANOGAN</u>							
Salmon Meadows	19A2M	4500	48	5.4	1.7	2.7	2.7
Trout Creek	3-M	3600	48	7.3	3.4*	3.8*	4.1
<u>YAKIMA</u>							
Domery Flat	21B20m	2200	48	6.9	2.4	--	3.1
Lake Cle Elum	21B14M	2200	48	12.8	7.6	--	5.2
<u>WALLA WALLA</u>							
Couse	17C3m	3650	48	11.1	5.9	6.1	7.4
Helmers	17C2M	4400	48	12.0	7.3	7.1	7.6
<u>WENATCHEE</u>							
Upper Wheeler	20B7M	4400	48	12.7	5.1	9.8	5.5

* Nov. 1 measurement



PRECIPITATION 1/
Division Averages and Departures

DRAINAGE DIVISIONS	FALL		WINTER		SPRING	
	Sept-Oct 1970 <u>2/</u>		Nov. '70 - Mar. '71 <u>2/</u>		April - May '71 <u>2/</u>	
	Observed	- Departure	Observed	- Departure	Observed	- Departure
Columbia in Canada	3.64	-0.25	15.63	+2.94	2.90	-0.24
Pend Oreille - Spokane	4.30	+0.42	19.87	+1.62	4.34	-0.30
Northeastern Washington	3.16	+0.91	11.07	-0.02	3.64	+0.32
Southeastern Washington	3.59	+0.94	12.11	-0.30	3.88	+0.27
Central Washington	3.05	-1.39	33.80	+6.67	2.17	-1.26
North Central Washington	1.36	-0.05	8.22	+1.88	1.90	+0.10
Northwest Slope Cascades	12.29	+0.62	63.74	+11.60	7.47	-2.16
Southwest Slope Cascades	7.74	+0.02	52.21	+11.34	5.36	-1.68

Northeastern Washington	- Lower Spokane, Colville, Sanpoil and lower Kettle drainages.
Southeastern Washington	- Touchet, Tucannon and Palouse drainages.
Central Washington	- Yakima, Wenatchee and Chelan drainages.
North Central Washington	- Methow and Okanogan drainages.
Northwest Slope Cascades	- Puget Sound drainages.
Southwest Slope Cascades	- Lower Columbia drainages.

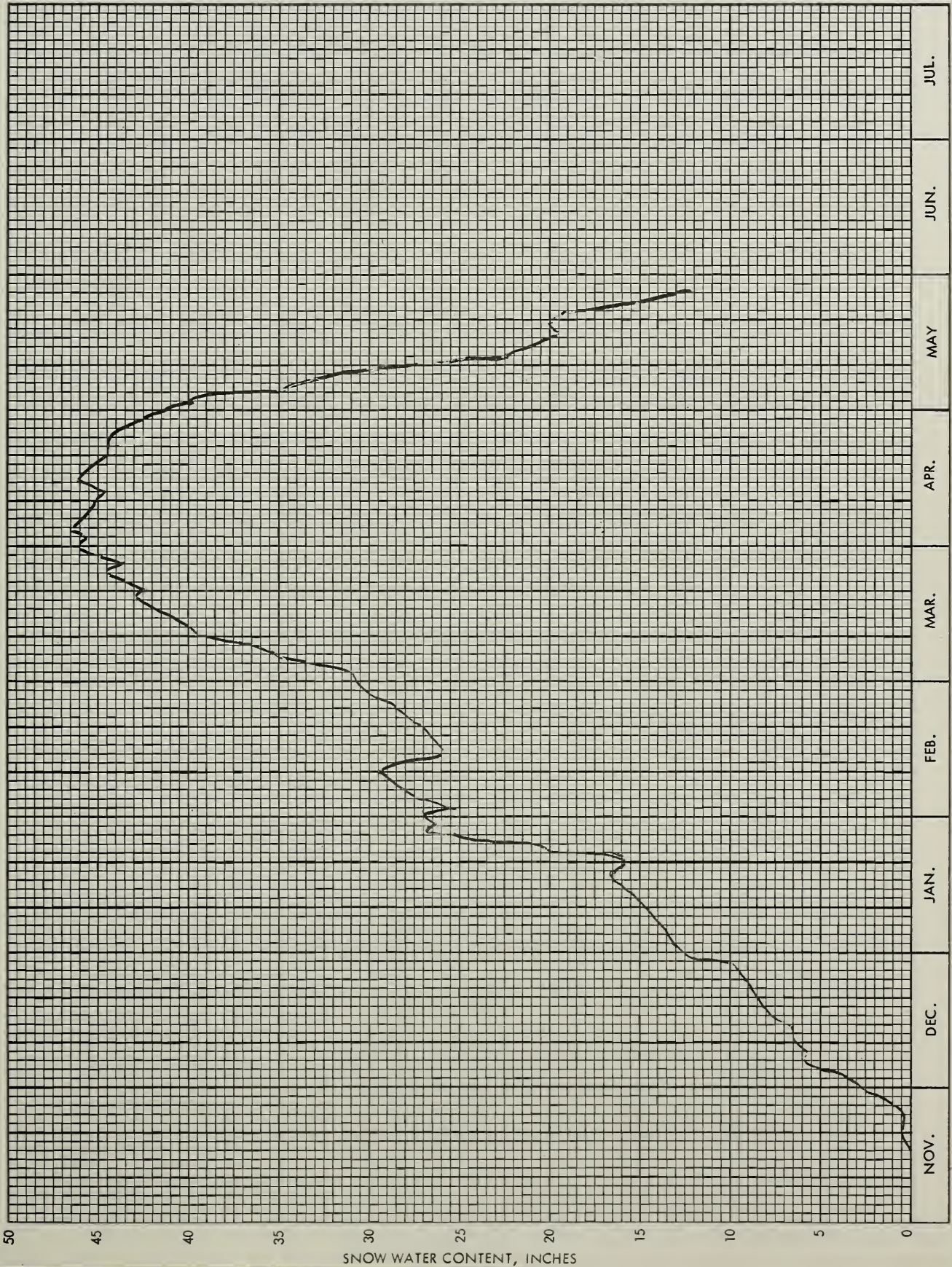
1/ - Preliminary analysis by National Weather Service from data furnished by Meteorological Services of Canada and National Weather Service.

2/ - Departure from 15-year (1953-67) drainage division average.

1970-71

SNOW PILLOW DATA
Cougar Mountain - FS

Sec. 21 T. 21N R. 9E No. 21B42SP Drainage: Green River
Lat. 47° 17' Long. 121° 40' Elev. 3200'



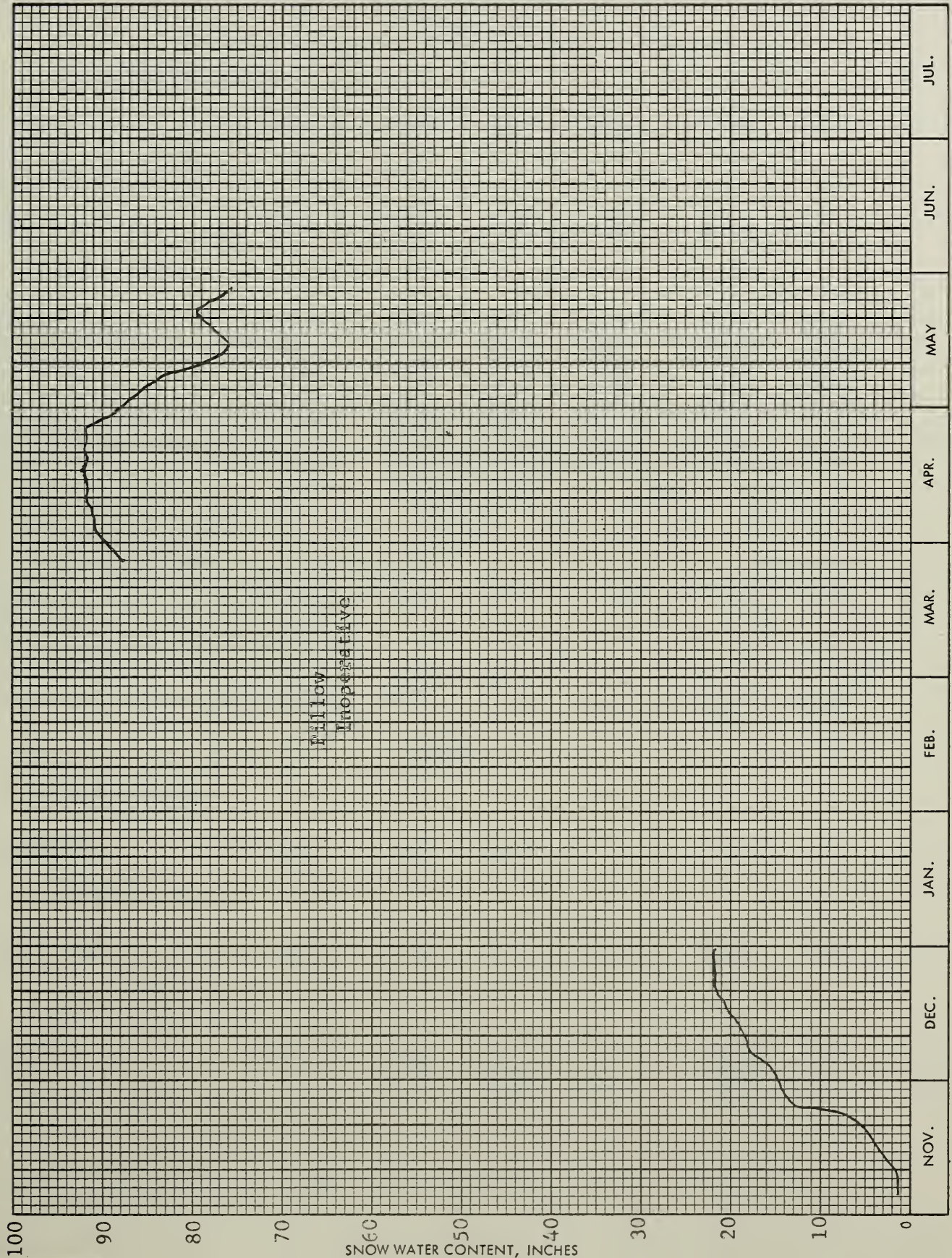
1970-71

SNOW PILLOW DATA

Snowshoe Butte - FS

Sec. 14 T. 20N R. 11E No. 21B43SF Drainage: Green River

Lat. 47° 13' Long. 121° 22' Elev. 4800'



APPENDIX 1
CORRECTIONS AND ADDITIONS - 1971 SNOW REPORTS

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	No.	Elevation				Last Year	Average ++

February 1PEND OREILLE RIVER

Hoodoo Creek	15C01	5900	1/28	<u>136</u>	47.0	31.8	32.0
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SKAGIT RIVER

Lake Hozomeen	21A02	2600	2/5	<u>41</u>	<u>13.2</u>	--	--
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BAKER RIVER

Dock Butte +	21A11A	3800	<u>2/5</u>	<u>173</u>	<u>77.8</u>	31.9	--
Jasper Pass +	21A6A	5400	<u>2/5</u>	<u>220</u>	<u>99.0</u>	<u>58.5</u>	--
Mt. Blum +	21A18a	5800	<u>2/5</u>	<u>119</u>	<u>53.6</u>	<u>34.2</u>	--
Rocky Creek +	21A12A	2100	<u>2/5</u>	<u>118</u>	<u>53.1</u>	<u>8.6</u>	--
Schreibers Meadow +	21A10A	3400	<u>2/5</u>	<u>152</u>	<u>68.4</u>	32.7	42.5*
S. F. Thunder Creek+	21A14A	2200	<u>2/5</u>	<u>47</u>	<u>21.2</u>	<u>3.0</u>	4.6*

March 1YAKIMA RIVER

Bumping Lake	21C08	3450	2/12	<u>49</u>	21.2	25.1	15.1*
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SKAGIT RIVER

Brown Top Ridge +	21A28a	6000	<u>3/1</u>	<u>156</u>	<u>64.0</u>	<u>35.0</u>	--
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April 1KETTLE RIVER

Goat Creek	18A04	3595	<u>3/9</u>	31	9.2	--	--
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YAKIMA RIVER

White Pass (L. Lake)	21C27	4500	3/30	108	<u>42.4</u>	31.5	32.6*
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BAKER RIVER

Easy Pass +	21A07A	5200	4/4	262	<u>117.7</u>	69.3	96.7*
Marten Lake +	21A09A	3600	4/5	<u>239</u>	<u>108.8</u>	55.8	88.2*
Schreibers Meadow +	21A10A	3400	4/5	<u>199</u>	<u>94.2</u>	44.8	73.3*

+ Snow water equivalent estimated from aerial stadia observation

* Adjusted 1953-67 average

APPENDIX 2
SNOW DATA MAY 1 to JUNE 1, 1971

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	No.	Elevation				Last Year	Average ††

U P P E R C O L U M B I A D R A I N A G E

PEND OREILLE RIVER

Baree Creek	15B11	5500	5/14	87	39.8	44.6	43.4
Baree Midway	15B16	4600	5/14	53	25.4	33.2	--
Baree Trail	15B15	3800	5/14	0	0.0	0.0	0.0
Heart Lake Trail	14C10	4800	5/14	28	14.0	17.2	--
			6/2	4	2.0	3.0	--
Hoodoo Basin	15C10	6000	5/14	109	55.2	52.6	--
			6/2	84	42.3	37.8	--
Hoodoo Creek	15C1	5900	5/14	108	52.7	48.7	42.5
			6/2	85	42.4	36.5	32.0
Lookout	15B2	5250	5/17	85	39.5	37.9	28.4
			6/2	35	18.2	20.7	--
Nelson	Canada	3050	5/14	2	1.0	0.3	0.7**
Schweitzer Bowl	16A6	4500	5/28	0	0.0	0.0	--
Schweitzer Ridge	16A5	6100	5/28	78	39.2	29.5	--

KETTLE RIVER

Big White Mountain	Canada	5500	5/14	40	17.8	15.6	17.5**
			5/31	25	11.1	6.6	8.9**
Carmi	Canada	4100	5/15	0	0.0	0.0	0.0**
Lower Trapping Creek	Canada	3050	5/15	0	0.0	0.0	0.0**
#Monashee Pass	Canada	4500	5/14	12	4.7	6.6	9.8**
			6/2	0	0.0	0.0	0.2**
#Old Glory Mountain	Canada	7000	5/15	55	25.7	20.1	29.8**
			5/31	34	15.9	8.8	17.6**
Upper Trapping Creek	Canada	5500	5/14	0	0.0	0.0	0.0**

SPOKANE RIVER

Granite Peak	15B13A	6000	Late Report			32.4	--
#Lookout	15B2	5250	5/17	85	39.5	37.9	--
			6/2	35	18.2	20.7	--
Lost Lake	15B14A	6000	Late Report			41.0	--
Medicine Ridge	15B4A	6150	Late Report			31.0	--

OKANOGAN RIVER

Blackwall Peak	Canada	6250	5/14	83	43.5	--	35.9**
			5/28	69	39.0	22.4	27.8**
Bouleau Lake	Canada	4500	5/15	26	8.8	--	--
Brookmere	Canada	3200	5/15	5	1.4	--	2.4**

Not located directly on this drainage

** Average for years of record

SNOW

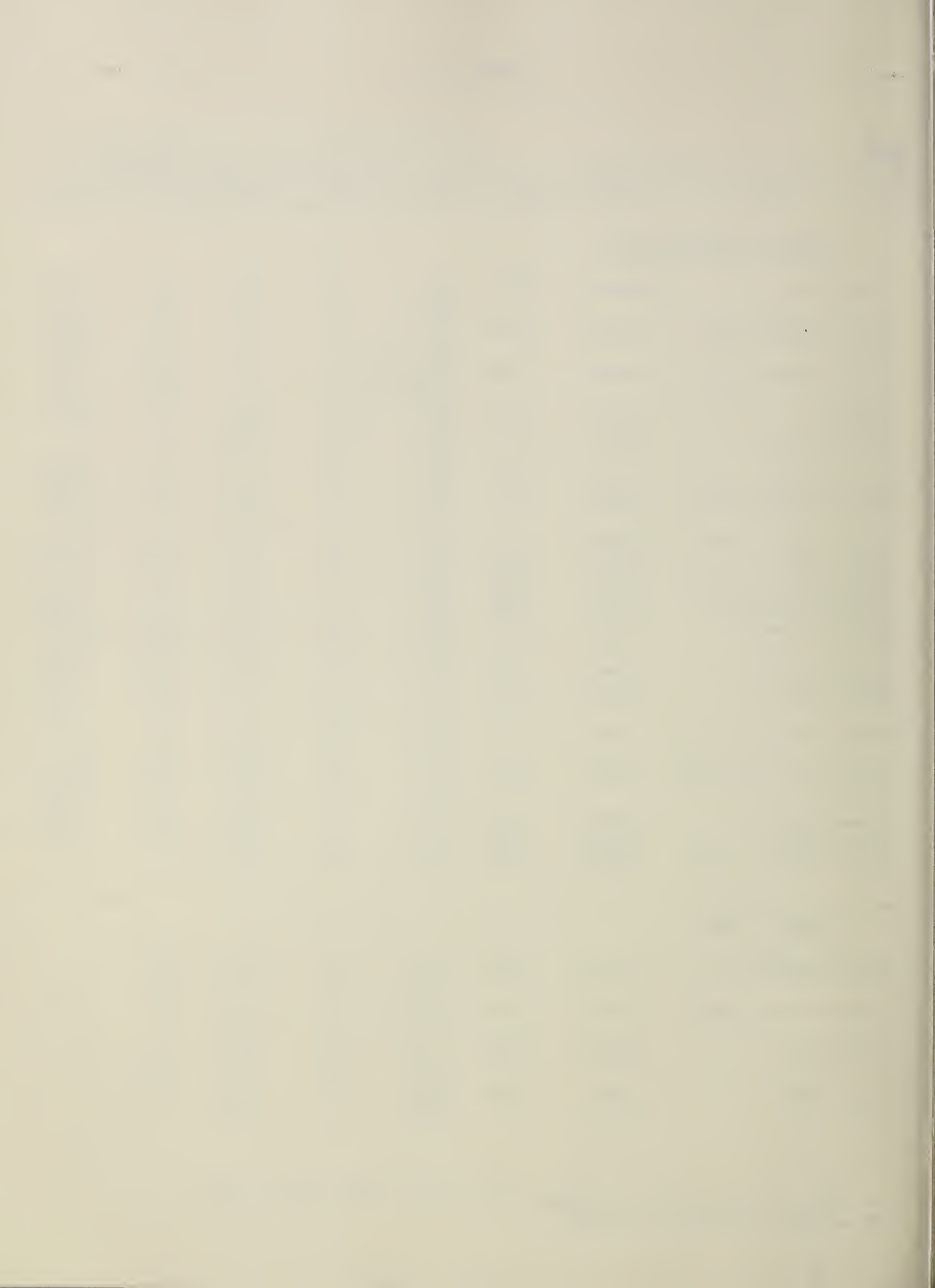
DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	No.	Elevation				Last Year	Average ++
<u>OKANOGAN RIVER (Cont.)</u>							
Brenda Mine	Canada	4800	5/12	0	0.0	0.0	0.0**
			5/25	0	0.0	0.0	0.0**
Carrs Landing Lower	Canada	2250	5/15	0	0.0	0.0	0.0**
			Not Measured			0.0	0.0**
Carrs Landing Upper	Canada	3200	5/15	0	0.0	0.0	0.0**
			Not Measured			0.0	0.0**
Enderby	Canada	6250	5/27	90	38.3	--	40.1**
Hamilton Hill	Canada	4900	5/14	13	6.7	9.8	7.1**
			5/29	0	0.0		
Isintok Lake	Canada	5510	5/15	3	1.0	4.2	3.7**
Lost Horse Mountain	Canada	6300	5/14	23	8.1	8.8	9.8**
			5/31	12	4.2	--	3.4**
Lower Esperon Creek	Canada	4270	5/12	0	0.0	--	--
McCulloch	Canada	4200	5/14	0	0.0	0.0	0.6**
Middle Esperon Creek	Canada	4580	5/12	11	4.6	--	--
Missezula Mountain	Canada	5100	5/14	0	0.0	--	2.4**
Mission Creek	Canada	6000	5/14	42	17.5	16.2	8.9**
			5/28	33	15.3	10.5	10.9**
Monashee Pass	Canada	4500	6/2	0	0.0	0.0	2.2**
Mount Kobau	Canada	5950	5/14	23	9.7	10.0	9.8**
			5/31	3	1.1	0.8	1.9**
Nickel Plate Mountain	Canada	6200	5/14	14	4.9	--	6.6**
			5/30	8	2.3	--	--
Silver Star Mountain	Canada	6050	5/16	54	22.5	19.9	25.4**
			5/31	29	13.9	9.3	14.4**
Summerland Reservoir	Canada	4200	5/15	2	0.7	1.1	1.9**
Trout Creek	Canada	4700	5/11	2	0.7	2.6	1.3**
Upper Esperon Creek	Canada	5290	5/12	26	13.3	--	--

ENTIAT RIVER

Entiat Meadows +	20A33a	4800	5/13	96	47.6	--	--
			5/28	62	32.9	27.0	--
Entiat River Trail +	20A34a	3150	5/13	12	6.0	--	--
			5/28	0	0.0	--	--
Fox Camp +	20A36a	6510	5/13	140	69.4	--	--
			5/28	128	67.8	36.0	--
Pope Ridge	20B20	4300	5/12	5	2.5	0.0	--
			5/28	0	0.0	--	--

+ Snow water equivalent estimated from aerial stadia observation

** Average for years of record



APPENDIX 4

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	No.	Elevation				Last Year	Average $\dagger\dagger$

ENTIAT RIVER (Cont.)

Pugh Ridge +	20A32a	6400	5/13	61	30.3	--	--
			5/28	47	24.9	18.5	--
Shady Pass	20A37	5000	5/14	40	19.6	21.0	--
Snow Brushy +	20A35a	3850	5/13	61	30.3	--	--
			5/28	29	16.2	10.0	--
Tommy Creek +	20B21a	5300	5/13	26	12.9	--	--
			5/28	5	2.8	7.0	--

WENATCHEE RIVER

Stevens Pass	21B01	4070	5/14	128	68.1	51.2	46.6
			5/28	107	58.6	39.6	31.2*
Stevens Pass S. Shed	21B45	3700	5/14	69	34.5	25.2	--
			5/28	42	24.7	13.3	--

YAKIMA RIVER

Bumping Lake	21C08	3450	5/14	20	10.5	--	--
Bumping Lake New	21C36	3400	5/14	32	16.9	--	--
#Olallie Meadows	21B02	3625	5/27	120	66.3	--	--
#Stampede Pass	21B10	3000	5/16	110	57.2	43.8	--
			5/31	77	42.4	21.3	18.5*
White Pass (E. Side)	21C28	4500	5/17	67	31.6	--	23.0*
			Late Report			--	12.7*
White Pass (L. Lake)	21C27	4500	5/17	65	31.5	--	--

COWLITZ RIVER

Pigtail Peak	21C33	5900	5/17	179	93.8	--	--
#White Pass (E. Side)	21C28	4500	5/17	67	31.6	--	23.0*
			Late Report			--	12.7*
#White Pass (L. Lake)	21C27	4500	5/17	65	31.5	--	--

PUGET SOUND DRAINAGEGREEN RIVER

Cougar Mountain	21B42SP	3200	5/26	9	5.2	--	--
Snowshoe Butte	21B43SP	5000	5/27	145	76.6	--	--
Stampede Pass	21B10	3000	5/16	110	57.2	43.8	34.8
			5/31	77	42.4	21.3	18.5*

Not located directly on this drainage

* Adjusted 1953-67 average

+ Snow water equivalent estimated from aerial stadia observation

APPENDIX 5

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	No.	Elevation				Last Year	Average ++

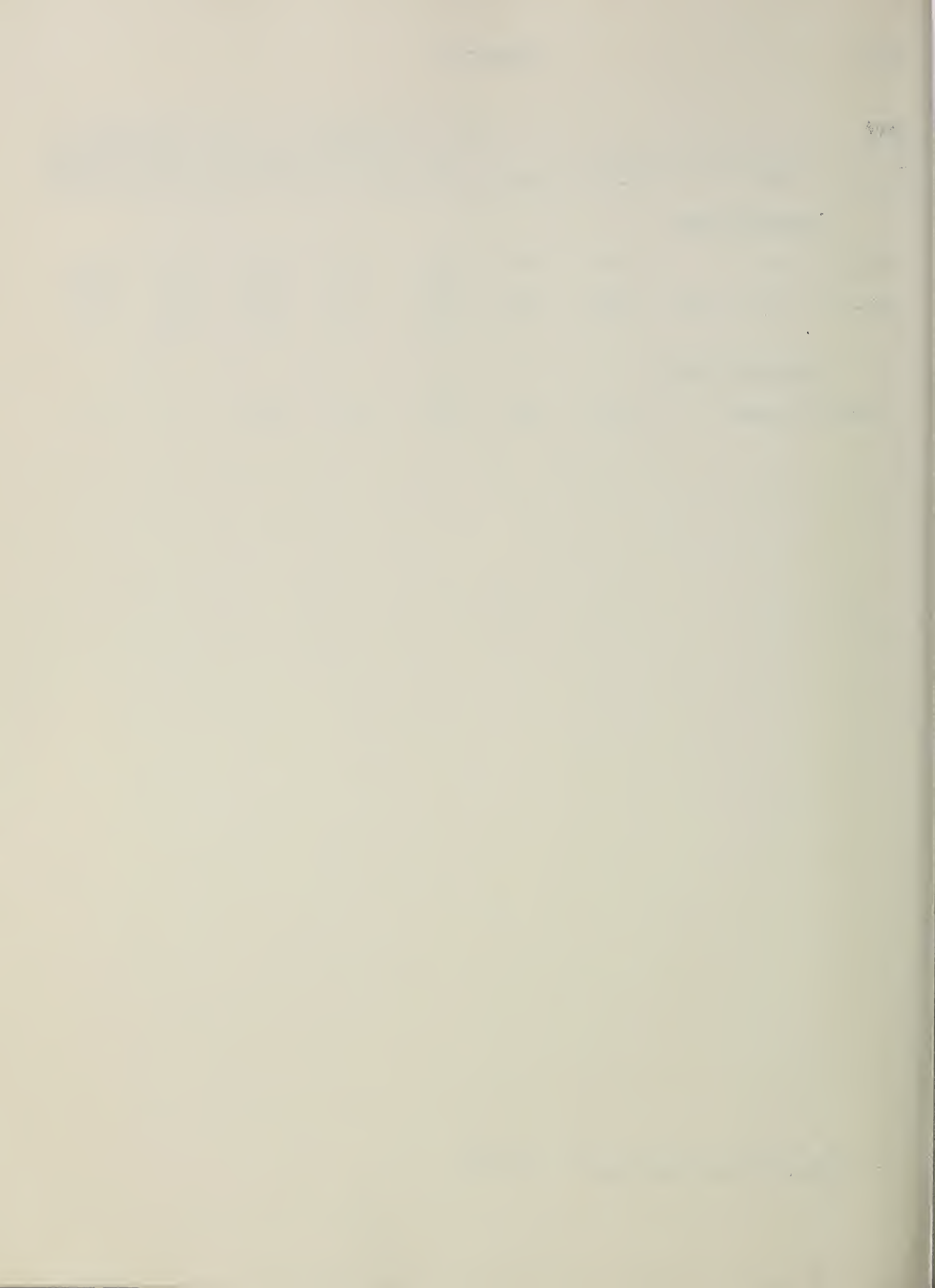
SKYKOMISH RIVER

#Stevens Pass	21B01	4070	5/14	128	68.1	51.2	46.6
			5/28	107	58.6	39.6	31.2*
#Stevens Pass S. Shed	21B45	3700	5/14	69	34.5	25.2	22.2
			5/28	42	24.7	13.3	--

SNOQUALMIE RIVER

Olallie Meadows	21B02	3625	5/27	120	66.3	--	--
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- # Not located directly on this drainage
 * Adjusted 1953-67 average



Agencies Assisting with Snow Surveys

GOVERNMENT AGENCIES

Canada:

Department of Lands, Forests and Water Resources,
Water Resources Service, British Columbia

States:

Washington State Department of Ecology
Washington State Department of Natural Resources

Federal:

Department of the Army
Corps of Engineers
U. S. Department of Agriculture
Forest Service
U. S. Department of Commerce
Weather Bureau
U. S. Department of the Interior
Bonneville Power Administration
Bureau of Reclamation
Geological Survey
National Park Service

PUBLIC AND PRIVATE UTILITIES

Chelan County P.U.D.
Pacific Power and Light Company
Puget Sound Power and Light Company
Washington Water Power Company

OTHER PUBLIC AGENCIES

Okanogan Irrigation District
Wenatchee Heights Irrigation District

MUNICIPALITIES

City of Tacoma
City of Seattle

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

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